

1 OPTIMIZED INTERNET ADVERTISING USING HISTORY TO SELECT SITES

3 Field of the Invention:

4 The present invention relates to computer networks and more particularly to a system
5 and method for presenting advertisements on the screens of computers that are
6 connected to the Internet.

8 Background of the Invention:

9 As used herein the term viewer refers to an individual who views or looks at a web page
10 using a program such as one of the commercially available web browsers. Co-pending
11 patent application serial number 08/787,979 filed 1/22/97 entitled "Internet Advertising
12 System" describes a system for presenting advertisements to viewers who access web
13 sites on the Internet (i.e. the World Wide Web). The present invention is an
14 improvement to the system shown in the above referenced patent application

16 The Hyper Text Transfer Protocol (HTTP) and the Hyper Text Mark Up Language
17 (HTML) provide a mechanism whereby one web site can easily link to a remote server.

18 The HTTP mechanisms for referencing and obtaining material from a remote server is
19 useful in providing advertising material for display to viewers. There are commercially
20 available systems that provide advertising material for web sites from a central server.

21 Various web pages have links to this central server. With such an arrangement, when a
22 viewer accesses a particular web page, a central server provides an advertisement that
23 the viewer sees on the web page.

25 Using standard HTTP facilities it is possible to track when a particular viewer accesses a
26 web site and thus it is possible to compile a data base which in essence provides a

1 profile of the sites a particular viewer has accessed using the same browser.
2 Furthermore, it is known that types categories of viewers generally access particular
3 categories of web sites. The capabilities inherent in the World Wide Web for tracking the
4 sites that a viewer has seen provides a mechanism for targeting particular
5 advertisements to particular types of viewers.

6

7 There are prior art systems that provide advertisements from a central server that has a
8 database of information on viewers. A database of viewer information can be compiled
9 from a variety of sources including the information about a viewer that is available when
10 a viewer accesses a server. In such prior art systems, the characteristics of the viewer
11 as provided by the data base of viewer information determines the particular
12 advertisement which is displayed when a particular viewer who accesses a web site.

13 Other information such as the characteristics of the web site can also be used to
14 determine which advertisement a viewer will see when a web site is accessed. Using
15 such systems advertisers can target advertisements by criteria such as web site
16 category, geographic location of the viewer, the operating system of the viewer's
17 computer, the type of browser which the viewer is using, the internet domain type of the
18 viewer, etc.

19

20 Advertisers who use such prior art systems must specify in advance, the targeting
21 criteria they want to use for their advertisements. The central server then provides
22 advertisements to viewers based upon: (a) the targeting criteria established by the
23 advertisers, (b) the information which the central server has in its data base concerning
24 the particular viewer, (c) information about the web site that has been accessed by the
25 viewer, and (d) other information available to the central server such as the time of day.

26

1
2 The previously referenced co-pending patent application describes a more complex
3 system for providing advertisements from a central advertising server to viewers who
4 access web sites. With the system shown in the referenced co-pending patent
5 application the system evaluates, in real time, bids submitted by different advertisers in
6 order to determine which particular advertisement will be displayed to a viewer.

7
8 The characteristics of each opportunity to present an advertisement to a viewer (that is,
9 the characteristics of what is herein termed a view-op) includes information such as the
10 characteristics of the particular web page being accessed, the characteristics of the
11 viewer including demographic information about the viewer, and information about other
12 sites this viewer has accessed in the past.

13
14 With the invention shown in the referenced co-pending application each advertiser
15 provides one or more "proposed bids" which specify how much the advertiser is willing to
16 pay for displaying a particular advertisement in response to a view-op with certain
17 characteristics. Each proposed bid specifies a price or amount that the advertiser is
18 willing to pay for the opportunity to display an advertisement (a) to a viewer who has a
19 particular set of characteristics and (b) on a web site and web page that meets a
20 particular set of criteria. Each proposed bid can be dependent upon or require
21 satisfaction of various criteria that must be met in order for a bid of a particular amount to
22 be submitted. For example a bidder might specify that the first one thousand times
23 when a view-op meeting certain criteria occurs, a bid of five cents will be submitted, and
24 each time thereafter that a view-op meeting the criteria occurs a bid of one cent will be
25 submitted. The amount bid for a view-op can be dependent on as many criteria as the
26 advertiser cares to specify. Another example is that an advertiser might bid ten cents if

1 the view-op were from a viewer who had recently visited a particular web page and one
2 cent for the same view-op if the viewer had not recently visited the particular web page.
3 Yet another example of a parameter that could be specified in a proposed bid is the rate
4 at which viewers "click" on an advertisement to obtain more information about what is
5 shown in the advertisement. The rate at which viewers "click" on an advertisement to
6 access another site linked to the advertisement is often referred to as the "click-through
7 rate". The bidding parameters can be either simple or complex.

8

9 With the system shown in the co-pending application when a view-op arises, the system
10 evaluates the characteristics of the view-op compared to the specifications of proposed
11 bids. Next, the bid selection logic selects the highest bid from the various available bids
12 and the advertisement that has the highest bid for the particular view-op is displayed.

13

14 **Summary of the Present Invention:**

15 The present invention is applicable to a system that includes: (a) a web server system
16 which stores advertisements and data bases, (b) bidding agents which submit bids to
17 display advertisements in view-ops which have certain specifications, and (c) bid
18 selection logic which decides which bid to accept for each particular view-op. With the
19 present invention when a view-op occurs which meets the specifications in a bid, the
20 view-op is further evaluated in terms of the comparative effectiveness of the particular
21 advertisements on each of the sites on which the advertisement was previously
22 displayed. The frequency of the advertisement is increased on sites that have proved
23 effective and decreased on sites that have a lower effectiveness. The present invention
24 thus adds an additional parameter that is considered and evaluated on a real time basis
25 to determine if a particular advertisement should be displayed in response to a particular

1 view-op. This additional parameter takes into consideration the effectiveness of this
2 particular advertisement on the sites where it was previously displayed.

3

4 **Brief Description of the Drawings:**

5 Figure 1 is a prior art system diagram.

6 Figures 2A and 2B are flow diagrams of the operations of the prior art system.

7 Figures 3A and 3B are flow diagrams of the present invention.

8

9 **Description of a preferred embodiment:**

10 The present invention is an improvement on the type of prior art system shown and
11 described in co-pending patent application serial number 08/787,979 filed 1/22/97 and
12 entitled "Internet Advertising System" which is assigned to the same assignee as is the
13 present application. The above referenced co-pending application is hereby
14 incorporated herein by reference in its entirety. In order to explain the principles of the
15 present invention, a simplified overall block diagram of the prior art system is shown in
16 Figures 1 and a simplified block diagram of the operation of the prior art system is shown
17 in Figures 2A and 2B.

18

19 After the operation of the overall prior system is described with reference to Figures 1,
20 2A, and 2B the preferred embodiment of the present invention will be described with
21 reference to Figures 3A and 3B. The present invention relates to an improvement in the
22 bid selection logic 16C that is shown in Figure 1.

23

24 The system shown in Figures 1 operates as follows: A human viewer 10 utilizes a client
25 web browser 11 to access a web page 12 on a web site 14. The web page 12 is
26 transmitted to browser 11 in a conventional manner. Web page 12 includes an HTML

1 reference to a file (i.e. an advertisement) located on an advertising web server system
2 16. The client web browser 11 has what is known in the art as a "cookie" 11A, which
3 provides information from browser 11 to the web server system 16. The client web
4 browser 11, the cookie 11A, the web site 14 and the web page 12 are all conventional
5 and in widespread use. For example, the client web browser 11 could be one of the
6 commercially available web browsers, for example, the commercially available and
7 widely used web browser marketed by Netscape Communications Corp. under the
8 trademark "Netscape Navigator" or the browser marketed by Microsoft Corporation
9 under the trademark "Internet Explorer". The web site 14 and the web page 12 could be
10 any of the thousands of web sites and web pages which are part of the World Wide Web
11 and which have HTML references to advertisements which are located on a remote
12 server.

13 Web page 12 includes an HTML reference to an advertisement stored on advertising
14 web server system 16. Each time client web browser 11 displays web page 12, the
15 human viewer 10 will see an advertisement which is provided by advertising web server
16 system 16. Such HTML references are in widespread use and they are implemented
17 using conventional HTML tags. Advertising web server system 16 includes a database
18 of advertisements 16A, a database of viewer information 16B, and bid selection logic
19 16C. The bid selection logic 16C receives bids from bidding agents 30A to 30Z which in
20 turn receive information concerning proposed bids from bid input system 18. For
21 purposes of illustration only three identical bidding agents 30A, 30B and 30Z are
22 specifically shown. The reference number 30 will be used to refer to a typical bidding
23 agent. It should be understood that the system could include any number of bidding
24 agents. For example, a system could include several thousand bidding agents 30. Bid
25 input system 18 provides bidding agents 30 with proposed bids which specify how much

1 should be bid for view-ops with particular characteristics. Each bidding agents 30
2 evaluates each view-op to determine if the view-op meets the criteria specified in a
3 particular proposed bid and if so how much should be bid.
4
5 Each bidding agent 30 evaluates a view-op with respect to one proposed bid to
6 determine if a bid should be submitted. Each proposed bid includes a list of parameters
7 that specify the particular type of viewer that the advertiser wants to reach. For
8 example, a proposed bid might specify that the advertiser is willing to pay five cents for
9 the opportunity to place an advertisement on a web page which is accessed by a viewer
10 who has accessed three financial web pages and an automotive web page within the
11 last week.

12
13 In general the system includes one bidding agent 30 for each proposed bid. Each
14 advertiser would have an associated bidding agent 30 for each ad campaign the
15 advertiser wants to conduct. Advertisers submit proposed bids to their associated
16 bidding agents for evaluation against view-ops. Bidding agents 30 can be simple or
17 complex and if desired they can have the ability to evaluate more than one proposed bid
18 to determine which bid should be submitted to the bid selection logic 16C.

19
20 When a view-op presents itself (i.e. when viewer 10 accesses a web page 11 which
21 contains an HTML reference to server system 16) the advertising web server system 16
22 performs four operations:

- 23 (1) It updates the information about the viewer that is in database 16B.
24 (2) It sends information concerning the view-op to the bidding agents 30. The
25 information sent includes information that the server system 16 received from

1 browser 11 and information in database 16B. Bidding agents 30 in turn decide
2 which bids to submit to bid selection logic 16C.

3 (3) It compares various bids received from bidding agents 30 in order to
4 determine which advertisement to display. (As explained later, with the present
5 invention, additional information is considered in order to determine which
6 advertisement should be displayed) and

7 (4) It sends the appropriate advertisement from data base 16A to browser 11.

8

9 The operations performed by advertising web server system 16 are shown in Figures 2A
10 and 2B. Figure 2A shows how server system 16 uses the information from cookie 11A

11 to update the database of viewer information 16B to reflect the fact that this particular
12 viewer has accessed this particular web page. The operations proceed as shown by
13 blocks 201 to 203. Block 201 indicates that a viewer has selected web page 12 and that
14 the selected web page has been transmitted to the viewer's browser 11. As indicated by
15 block 202, web page 12 has an HTML reference to a file on server system 16 using
16 conventional HTML techniques. Block 203 indicates that the server 16 then obtains data
17 from cookie 11A to update the database of viewer information 16B.

18

19 When a viewer 10 accesses web page 12, which has an HTML reference to server
20 system 16, the system determines which advertisement from database 16A to present to

21 the viewer. The manner in which the system performs these operations is shown by
22 block diagram 2B. For example, one advertiser might have submitted a proposed bid to
23 bidding agent 30A which specified that he is willing to pay five cents for displaying an ad
24 to a viewer who has accessed at least three financial oriented web sites within the last
25 week. Another advertiser might have submitted a proposed bid to bidding agent 30B
26 specifying that he is willing to pay six cents for displaying an advertisement to a viewer

1 that has accessed at least three financial oriented web sites within the last five days.
2 When a view-op occurs which is initiated by a viewer 10 who has accessed three
3 financial oriented web sites in the last five days, bidding agents 30A and 30B would
4 determine that the particular view-op satisfies the criteria specified by both advertisers.
5 Both bids would be submitted to bid selection logic 16C, and bid selection logic 16C
6 would then select the highest bid, and the advertisement specified by that advertiser
7 would be displayed to the viewer. The criteria specified by the advertisers may be much
8 more complex and involve many more parameters than those given in the simple
9 example specified above. However, notwithstanding the complexity of the proposed
10 bids and the number of parameters specified in each proposed bid, the basic operations
11 performed by bidding agents 30 and by bid selection logic 16C are as illustrated in the
12 above simple example.

13

14 As shown in Figure 2B, a cycle of operation begins (block 210) when a viewer 10 selects
15 a web page 12 which has a HTML reference to web server system 16, that is, when a
16 view-op occurs. It is noted that this occurs in real time and it can take place thousands
17 of times per second. Block 211 indicates that the web server system 16 sends
18 information concerning the view-op and related information in the database 16B to the
19 bidding agents 30. The bidding agents 30 compare the information about the view-op to
20 the proposed bids that have been submitted by advertisers. That is, the bidding agents
21 30 determine if the characteristics of the view-op meet the criteria in the proposed bids
22 and if so they submit bids to bid selection logic 16C (block 213). As shown by block 214,
23 the bid selection logic 16C compares various bids and selects the highest bid and
24 therefore an advertisement for display. The appropriate advertisement called for by the
25 winning bid is then sent from database 16A to browser 11 (block 215).

26

1 Block 212 indicates that each advertiser submits proposed bids. Each bid includes
2 various parameters that, for example, specify the type of web page on which the
3 advertiser wants to advertise and an amount, (i.e. the dollar amount) which the
4 advertiser is willing to pay for having a particular advertisement displayed
5

6 In order to understand the power of the type of system shown in Figures 1 and 2, it is
7 important to realize that the bidding agents 30 evaluate proposed bids in microseconds,
8 that is, in real time. The rate at which "hits" on web pages occur (i.e. the rate at which
9 viewers access web pages that have HTML reference to server system 16) can be in the
10 order of thousands per second. Thus, the evaluation of proposed bids is performed very
11 quickly in real time. Proposed bids can contain parameters which specify that a
12 proposed bid will in effect change in real time. For example a proposed bid might
13 specify that for the first 1000 matching view-ops, the proposed bid will be five cents and
14 for the next 1000 matching view-ops the proposed bid will be four cents. The actual
15 submission of proposed bids by advertisers and the rate at which advertisers can
16 change their proposed bids is measured in minutes compared to the rate at which the
17 system evaluates proposed bids which is on the order of microseconds.
18

19 The operation of the browser 11, the operation of the web server 14, and the manner in
20 which web pages produce HTML references to web server system 16 using the HTTP
21 protocol and HTML mark up language are described in numerous published books such
22 as:"HTML Source Book A Complete Guide to HTML" by IAN S. Graham, published by
23 John Wiley and Sons (ISBN 0 471-11849-4) or "The Internet Compete Reference" by
24 Harley Hahn and Rick Stout, published by Osborne McGraw-Hill, ISBN 0 07-881980-6.
25 Numerous other books are also available which describe the HTTP protocol. Such
26 books describe how a browser, such as 11, can access a web page, such as web page

1 12, which in turn has an HTML reference to a file (i.e. an advertisement) stored on a
2 server such as advertising server system 16.

3

4 The present invention provides an additional parameter that is taken into account in
5 determining which advertisement will be displayed in response to a particular view-op.

6 The additional parameter provided by the present invention is a parameter that is based
7 upon the effectiveness of a particular advertisement on a particular web site in
8 comparison to the effectiveness of this same advertisement on the other web sites
9 where it has been displayed. The following highly structured and simplified example
10 illustrates the operation of the present invention. The operation of the invention as
11 applied to a "real-world" situation will be explained later.

12

13 Consider the following situation: an advertiser wants to have an advertisement displayed
14 10,000 times per day for a 10 day period (that is, 100,000 time) in response to view ops
15 that meet certain criteria.

16 For this example assume:

17 (a) that the advertiser bids ten cents for each of these view-ops.

18 (b) that view-ops that meet the specifications in the bid are on average occurring on
19 1000 sites at a rate of 40 view-ops per day per site.

20 (c) that the view-ops occur evenly spaced during the day and that the view ops occur in
21 an even stream from the sites. That is the view-ops occur in an orderly sequence such
22 as site1, site2, site3.....site 1000, site 1, site2, site3,site 1000.

23 (d) that for the view-ops on 500 of these sites, some other advertiser has a higher bid.

24

25 Thus there will be 500 sites, each receiving 40 view-ops per day which fit the ad's
26 criteria and where this advertiser's bid is the highest bid.

With the prior art system, the advertisement would be displayed 20 times per day on each of the 500 sites. That is, the advertisement would be displayed 50 percent of the times that view-ops meeting the criteria occur. By displaying the ad 50% of the time that appropriate view-ops are presented the advertising campaign lasts the ten days in accordance with the original specifications provided by the advertiser.

Note: 20 view-ops per day times 500 sites times 10 days equals 100,000 view-ops.

With the present invention the above example would be handled as follows:

The first 1000 opportunities to display the advertisement are chosen using the old technique described above. This is termed an initialization period and it is used to obtain some data upon which subsequent decisions can be based.

When the 1001st view-op is encountered the system makes the following calculation:

Each site where the advertisement was presented during the initialization period is evaluated to determine the number of "click throughs" that resulted from the advertisements displayed on that site. Next the number of "click throughs" that would have resulted is calculated for each site based on the assumption that each opportunity to display on that site was taken. This gives a number which represents the "relative goodness" of each site.

Let us assume that the goodness numbers are as follows:

For one hundred sites (called Sites A) the goodness is 10

For one hundred sites (called Sites B) the goodness is 8

For one hundred sites (called Sites C) the goodness is 5

For 200 sites the goodness is 1

1
2 The selection criteria for sites A is set to 100 percent.
3 The selection criteria for sites B is set to 80 percent
4 The selection criteria for sites C is set to 50 percent
5
6 The selection criteria for the remaining sites is set to 10 percent in order to continue
7 gathering data from these sites for future calculations. The percentages of all sites is
8 chosen so that at the present rate of view-ops, the total view-ops specified in the bid will
9 be reached in the desired time period.
10
11 The above calculation is re-made each time a new viewing opportunity is presented.
12 Thus in the example given above the calculation is made approximately ninety nine
13 thousand times. It should be noted that sites not used for advertisements as a result of
14 the calculations made as described above are made available to the next lower bidder
15 and that in the placement of advertisements on these sites, the process described above
16 is repeated.
17
18 It might seem that with the present invention a great deal of calculating is made in order
19 to determine which advertisement should be placed in response to a view-op. However,
20 it should be considered that in practice advertisers pay up to a few cents for presenting
21 particular advertisements on particular sites. With modern day computers the cost of
22 making the type of calculations required by the present invention are in the range of or
23 less than mills (i.e. tenths of a cent) rather than cents
24
25 The present invention optimizes the placement of advertisements, that is,
26 advertisements are placed on sites where they are most effective. As described above,

1 the optimization is based upon "click-through" rate. It is noted that the system could
2 similarly optimize placement of advertisements based on a wide variety of other criteria.
3 For example, instead of making the calculations based upon click-through rate, the
4 calculations could be made based upon a measure of telephone inquires made as a
5 result of advertisements, or upon the number of sales that result directly related to an
6 advertisement. Any measurable criteria specified by an advertiser could be used in
7 place of the click through rate described above. It is also noted that as described above,
8 the initial selection of what advertisement to place on a site is based upon a bidding or
9 auction system. It is noted that the present invention could also be applied in situations
10 where the initial selection criteria is something other than a bidding system. However,
11 the initial selection is made as to which advertisement to place in response to a view-op,
12 optimization could be achieved by calculating the relative goodness of placing
13 advertisements on various sites as described herein and using this parameter in the
14 selection process.

15

16 In some circumstances, a system might not include enough computational power to
17 make a calculation each time a view-op occurs. In such a system, the calculations
18 described herein could be made every other, every third, or on some other schedule.
19 Naturally, limiting the frequency of the calculations would somewhat decrease the
20 effectiveness of the system.

21

22 Figures 3A and 3B are flow diagrams showing the operation of the present invention.
23 Figure 3A shows the operation of the invention during the initialization period. This
24 period continues until an advertisement is displayed 1000 times (or until an
25 advertisement has been displayed for a pre-specified percent of the total number of
26 impressions desired). For the present embodiment it is assumed that each

1 advertisement is scheduled for display at least ten thousand times. Thus the
2 initialization period can extend for up to ten percent of the times that an advertisement is
3 displayed. It is however, noted that in practice, most Internet advertisements are
4 displayed many more than 1000 times, thus, the initialization process takes much less
5 than ten percent of the total view-ops. The length of the initialization period is arbitrary,
6 so long as it is long enough to give some valid data to use in the initial calculations.

7

8 During the initialization period the results achieved by each advertisement in the form of
9 "click throughs" is evaluated. As previously explained, while the present embodiment
10 utilizes "click throughs" as a measure of the effectiveness of an advertisement in certain
11 situations other measurements could be used. For example, in a situation where an
12 advertisement results in a request for literature, the number of requests for literature
13 could be a measure. Other measures of the effectiveness of advertisements could also
14 be devised.

15

16 After the initialization period the process continues as shown in Figure 3B. The series of
17 steps shown in Figure 3B is performed as each view-op that meets a bid's specification
18 becomes available. The steps show in Figure 3A and 3B will now be explained in detail.

19

20 The steps shown in Figure 3A are performed during the initialization period. As
21 indicated by blocks 301, 303 and 305, when a view-op becomes available, its properties
22 are compared to the properties set out in the various bids, and the highest matching bid
23 is selected. Next as indicated by block 307, a determination is made as to whether or
24 not this view-op is needed to meet the schedule set out in the winning bid. If it is not
25 needed, this view op is assigned to the next lower matching bid as indicated by block
26 309. If it is needed to meet the schedule, a check is made to determine if the

1 initialization period is complete. If the initialization is not complete, the advertisement is
2 displayed as indicated by block 312. As indicated by block 315, if the initialization period
3 is complete, the process switches to the procedure shown in Figure 3B.

4

5 Figure 3B shows the procedure that is followed after the initialization period. Steps 321,
6 323, and 325 are identical to the corresponding steps shown in Figure 3A and previously
7 explained. Next as indicated by block 331, the system looks at the results achieved at
8 each site where an advertisement was previously displayed and the results achieved are
9 examined. In the simplest case this would be the number of "click-throughs" which
10 resulted from the advertisement. That is, the number of times a viewer clicked on the
11 advertisement in order to be linked to the advertiser's web site. The actual number of
12 click-throughs is adjusted to take into account the fact that not each appropriate view-op
13 was selected in step 327. For example, if:

14 (a) the advertisement was displayed one hundred times on a particular site and
15 five click throughs resulted,

16 (b) only fifty percent of the view-ops had been selected for display of this
17 advertisement (that is, only fifty percent of the view-ops were selected in previous
18 steps 307 and 335),

19 then the relative goodness number would be "ten" for this site

20

21 Block 333 indicates that the selection or scheduling criteria for each site is set based
22 upon the goodness numbers calculated in step 331. The percentage of view-ops
23 scheduled for each site is scaled so that these values are in proportion to the "goodness"
24 numbers and so that the total number of placements desired by the advertiser will be
25 met if the situation were to remain stable at the present values. It must however be

1 recognized that while at each point these numbers are established on the basis that the
2 situation will remain stable, the values are recalculated as each view-op occurs.

3

4 Block 335 indicates that a determination is then made based on the new scheduling and
5 selection criteria. If it is determined that this view-op should be taken, the advertisement
6 is displayed as indicated in block 339. After the advertisement is displayed, the system
7 waits for the next appropriate view-op and the procedure is repeated. If the
8 determination in block 335 results in a decision that the view-op should not be taken, the
9 view-op is assigned to the next lower bid and the procedure is repeated for that bid.

10

11 The flow diagrams shown in Figure 3A and 3B can be programmed in any appropriate
12 computer language. The particular language taken would be determined by the
13 particular computer system being used. Fast personal computers and servers are
14 available. Such servers would normally be programmed using a language such as C++.
15 The actual coding of the steps shown in Figures 3A and 3B is conventional.

16

17 It should be noted that it is herein assumed that a viewer always accesses the World
18 Wide Web using the same browser, so that the cookie in a browser accurately reflects
19 what a viewer has done. It is also assumed that only one viewer uses a particular
20 browser, again so that the cookie in the browser accurately reflects what the particular
21 viewer has done. Some inaccuracy in the calculations naturally results since the above
22 assumptions are not always true. However, the resulting inaccuracy merely detracts
23 from the overall efficiency of the advertising programs. Using the invention described
24 herein nevertheless makes advertising more effective than it would be if the technique
25 were not used.

26

1 While the invention has been shown and described with respect to a preferred
2 embodiment thereof, the scope of the applicant's invention is limited only by the
3 appended claims. Various changes in form and detail can be made without departing
4 from the spirit and scope of the invention.

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